Translation

PCT/DE2003/002886

PATENT COOPERATION TRE

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2002P07763WO	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/DE2003/002886	International filing date (*day/month/year*) 01 September 2003 (01.09.2003)	Priority date (*day/month/year*) 30 September 2002 (30.09.2002)
International Patent Classification (IPC) or national classification and IPC G02F 1/1335		
Applicant SIEMENS AKTIENGESELLSCHAFT		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 11 sheets, as follows:

      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

   ☒ Box No. I Basis of the report
   ☐ Box No. II Priority
   ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   ☐ Box No. IV Lack of unity of invention
   ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   ☐ Box No. VI Certain documents cited
   ☐ Box No. VII Certain defects in the international application
   ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand 12 February 2004 (12.02.2004)	Date of completion of this report 22 December 2004 (22.12.2004)
Name and mailing address of the IPEA/EP Facsimile No.	Authorized officer Telephone No.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

[redacted]ational application No.
PCT/DE2003/002886

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language _____, which is language of a translation furnished for the purpose of:

☐ international search (under Rules 12.3 and 23.1(b))

☐ publication of the international application (under Rule 12.4)

☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☐ The international application as originally filed/furnished

☒ the description:

pages 7-9, as originally filed/furnished

pages* 1-6, 6a received by this Authority on 21 July 2004 (21.07.2004)

pages* _____ received by this Authority on _____

☒ the claims:

pages _____, as originally filed/furnished

pages* _____, as amended (together with any statement) under Article 19

pages* 1-21 received by this Authority on 21 July 2004 (21.07.2004)

pages* _____ received by this Authority on _____

☒ the drawings:

pages 1/3-3/3, as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PREL ARY EXAMINATION REPORT

International application No.
PC[redacted]DE 03/02886

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-21	YES
	Claims		NO
Inventive step (IS)	Claims	15, 17-21	YES
	Claims	1-14, 16	NO
Industrial applicability (IA)	Claims	1-21	YES
	Claims		NO

2. Citations and explanations

Cited documents

D1: GB-A-2361581
D2: DE-U-20005862
D3: US-A1-2002050958
D5: US-B1-6194839
D6: GB-A-2370103
D7: US2002101362

1 The present application fails to meet the requirements of PCT Article 33(3) because the subject matter of claims 1 to 14 and 16 does not involve an inventive step.

1.1 Document D1 discloses, in figure 5, an illumination device for backlighting an image reproduction device containing light valves ("backlight for an LCD", line 16 of the abstract),

a) wherein the light spots formed by a plurality of light-emitting diodes (figure 5C: "light emitting diode chips" 12 and 12') are arranged in the shape of a grid (figure 5A), and

b) wherein the light-emitting diodes of each light spot (page 9, lines 16 to 18) are applied to a

flat, heat-conducting substrate ("heat dissipating substrate" 11).

Claim 1 differs from the illumination device in figure 5 of D1 only in that the light-emitting diodes are not applied directly to the heat-conducting substrate, but rather to the substantially level surfaces of submounts which have good heat-conducting properties and are connected to the flat heat-conducting substrate in a manner that conducts heat well. Figure 2E in D1 discloses the use of this type of submount 115 for a light-emitting diode 12. The submount 115 has a level surface (see figure 2E), has good heat-conducting properties (page 5, lines 5 to 7) and is connected to the flat ("mounting region" 111 is flat) heat-conducting substrate ("heat dissipating substrate" 11) in a manner that conducts heat well. It would be obvious to a person skilled in the art wishing to compensate the coefficients of thermal expansion between the diodes and the substrate (page 5, lines 5 to 7) to use this type of submount. The submount 115 in figure 2E is clearly electrically connected to the light-emitting diodes, since only an electrical conductor 132 is shown. It is, however, obvious that a person skilled in the art would apply the light-emitting diodes, which in the configuration in figure 5 are applied in an electrically insulated manner to the substrate (page 9, lines 16 to 18), also to the submount in an electrically insulated manner. Furthermore, the configuration in figure 5C, with a plurality of light-emitting diodes in one light spot, would suggest to a person skilled in the art the use of a single submount for all light-emitting diodes of a

light spot. A person skilled in the art would thus obtain an illumination device having all the features of claim 1 without thereby being inventive.

The surface of the light points in figure 5A, and therefore also that of the submounts in the modified illumination device, is smaller than the surface established by the grid, and conductors for supplying power ("printed circuit board" 13) are disposed on the substrate surface between the light points. Claim 2 is therefore also non-inventive.

Regarding claim 3, D2 indicates that flat conductors and conductors in a flexible foil ("foil cable", page 4, line 19) are generally known for supplying power to LEDs. Claim 3 therefore cannot be considered inventive.

It is not clear in figure 2E of D1 of which material the submount consists. However, it would seem obvious to a person skilled in the art to select a material with good heat-conducting properties, such as silicon. Claim 4 is therefore also non-inventive.

The heat-conducting substrate in D1 can be made of aluminium or copper (lines 5 and 6 of the abstract) and is connected to a heat sink ("heat dissipating slots" 113); the spaces between the light points are filled with plastics (figure 2E: "positioning layer" 16). Consequently, claims 5 to 8 are also non-inventive in relation to D1.

Regarding claims 9 to 11, D3 discloses, in figure 8, a group of four light-emitting diodes, which form a

light spot, two of which are green, one of which is blue and one of which is red, the four together producing white light. A person skilled in the art wishing to generate a luminous white light would, without being inventive, integrate this type of arrangement into the illumination device of D1 and would thus obtain an illumination device having all the features of claims 9 to 11.

The recess in which the light-emitting diode in figure 2E of D1 sits acts as a reflector owing to the material from which the substrate is made (aluminium, copper) and the recess is filled with transparent plastics ("protecting epoxy" 14). Consequently, claims 12 and 13 also fail to involve an inventive step.

In figure 5A of D1, the different light spots are connected in series to an electric circuit. Thus, each light-emitting diode of one light spot is connected in series to each of the light-emitting diodes of a plurality of other light spots. Claim 14 is therefore also non-inventive.

Regarding claim 16, D7 discloses, in addition to a group of light-emitting diodes, a back-up group of light-emitting diodes of the same colour, this group being connected to a back-up electric circuit and being used in the event of a power failure. Consequently, claim 16 also cannot be considered inventive.

2 Claims 15 and 17 to 21 appear to be novel and inventive in relation to the available prior art.

2.1 The interleaved arrangement of light spots, the light-emitting diodes of which each belong to an electric circuit, with light spots of a different electric circuit, as defined in claim 15, is not suggested by the available prior art. Furthermore, compensation control of light-emitting diodes of certain colours when the light-emitting diodes of a different colour fail, as defined in claim 17, is not suggested by the available prior art. Also, the specific arrangement in claim 20 of 4x8 green and red light-emitting diodes, which are controlled by four electric circuits, each of two electric circuits being associated with the light-emitting diodes of the same light spot, which are distributed in a checkerboard pattern over the 4x8 grid would not be obvious to a person skilled in the art.

Claims 18, 19 and 21, which are dependent on claim 17 or claim 20, are likewise novel and inventive.

3. The illumination devices as per claims 1 to 21 are industrially applicable.